UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/634,651	08/05/2003	Martin Malservisi	GOUD1240	6363

38396 7590 03/21/2007
JOHN BRUCKNER, P.C.
P.O. BOX 490
FLAGSTAFF, AZ 86002

EXAMINER	
WILLIAMS, SHERMANDA L	
ART UNIT	**PAPER NUMBER**
1745	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/21/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)
	10/634,651	MALSERVISI ET AL.
	Examiner	Art Unit
	Shermanda L. Williams	1745

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 December 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-7,9,10,13-35, and 40-59* is/are pending in the application.

4a) Of the above claim(s) *1-4 and 44-59* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *5-7,9,10,13-35 and 40-43* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *05 January 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *11/7/03, 3/22/04, 7/5/2006*.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

This office Action is responsive to the Amendment After Non-Final Rejection filed 12/19/2006. Claims 1-7, 9, 10, 13-35, 40-59 are pending. Claims 1-4, and 44-59 are withdrawn from further consideration as being drawn to a non-elected invention. Claims 8, 11, 12, and 36-39 have been cancelled. Claims 5, 7, 10, 13, 15, 22-24, 26, 28, 29, 31, 33, and 35 have been amended. Claims 5-7, 9, 10, 13-35, and 40-43 are finally rejected for reasons necessitated by applicant's amendment.

Priority

1. Applicant's claim for the benefit of a prior-filed application under 35 U.S.C. 119(e) or under 35 U.S.C. 120, 121, or 365(c) is acknowledged.

Information Disclosure Statement

The information disclosure statements (IDS) submitted on 11/7/03, 3/22/04, and 7/5/06 have been placed in the application file, and the examiner has considered the information referred to therein.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claim 5 and 15-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Huot (US 6,344,295) in view of Fujii et al. (JP 07-069631). Hout discloses a zinc

alloy powder for use in electrochemical cells. Hout teaches the log-normal particle size distribution of the zinc powder determined by separating the particles into size categories and plotting the weight (col. 5 lines 57-67). A linear correlation was computed and expressed in term of the particle diameter and the slope (Table 1). Hout does not specifically teach that the zinc powder particles have an aspect ratio of between 8 and 22.

With respect to claims 15-20, the limitation that the battery grade zinc powder is comprised of up to about 50 percent or up to about 20 percent of a second fine zinc metal or zinc alloy encompasses having 0 percent of the second zinc metal or alloy.

4. Fujii et al. teaches a flaky electrically conductive zinc oxide and its production. The aspect ratio is defined as the ratio of the average particles diameter to the average particle thickness. Fujii et al. teaches that if the thickness of the zinc particle is too thin or too thick, it will have an adverse effect on the fuel cell performance (paragraph 12, 13).). If the flake is too thick, the flakes will collapse at the time of activity. If the flake is too thin, the number of flakes per unit weight will decrease and the addition of conductivity will fail. It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the zinc particles of Hout to include zinc particles that are acicular or spherical in nature having an aspect ratio of 3 to 100 such as taught by Fujii et al in order to have a conductivity of the zinc particles and prevent the collapsing of the particle as taught by Fujii et al.

5. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Huot in view of Fujii et al. as applied to claim 5 above, and further in view of Clash (US

09/403,965). The disclosure of Hout in view of Fujii et al. as discussed above are incorporated herein. Huot in view of Fujii et al. does not teach that the particles of the zinc powder have a teardrop shape.

6. Clash discloses zinc shapes for electrochemical cells. Clash teaches that zinc particles can have spheroid morphology such as spherical or teardrop shapes (page 4 lines 8-9). Clash teaches that the zinc particle shape is critical to electrochemical activity of the cell (page 3 lines 4 and 5). Clash teaches that the uniform shape of the zinc particles provide the advantage of a uniform bulk density and consistent particle-to-particle contact (page 3 lines 9-11). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the particle of zinc powder of Huot in view Fujii et al. to include teardrop shaped particles as such as taught by Clash in order to maintain consistent contact between the zinc particles and optimum electrochemical activity in the cell.

7. Claims 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Huot and Fujii et al. in view of Clash as applied to claim 6 above, and further in view of Urry (US 6,022,639). The disclosure of Hout and Fujii et al. in view of Clash as discussed above is incorporated herein. Huot and Fujii et al. in view of Clash does not teach the average zinc particle length or width.

8. Urry '639 discloses a zinc anode for an electrochemical cell. The zinc anode is comprised of zinc particles or flakes having an average length of 0.024 inches or approximately 610 microns (col. 3 lines 6-9; 28-30). Also, Urry '639 teaches that the width of the zinc particle ranges from 0.024 to 0.040 inches or approximately 610 to

1,016 microns (col. 3 lines 28-30). The particle length and width taught by Urry '639 falls with the ranges of the current application respectively. Urry '639 teaches that the thickness of the zinc material is preferably 10 to 20 times smaller than the next smallest dimension (col. 3 lines 18-20) in order for the particles to flow. Urry '639 also teaches that the thinner particles have the better optimum current density (col. 3 lines 25-26). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the zinc particles of Hout and Fujii et al. in view of Clash to have the stated characteristics of particle length or width of 250 to 3000 micrometers to optimize the current density in the electrochemical cell.

9. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Huot in view of Fujii et al. as applied to claim 5 and further in view of Chi et al. (6,479,188). The disclosure of Hout in view of Fujii et al. as discussed above is incorporated herein. Huot in view of Fujii et al. does not teach that the particles of the zinc powder have an acicular or stranded shape.

10. Chi et al. discloses a cathode tube for use in electrochemical cells such as zinc air cells. Chi teaches an anode containing zinc particles that have an aspect ratio of at least two and are acicular in shape (col. 4 lines 63-67; col. 5 lines 16-19). As well, Chi teaches that the zinc particles may be spherical. It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the zinc particles of Huot in view of Fujii et al. to be acicular or spherical in nature having an aspect ratio between 2 and 30 such as taught by Chi et al. in order to have a needle-like

particle shape. The zinc particles of the acicular shape for enhanced contact between the zinc particles.

Claims 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Huot in view of Fujii et al. and Chi et al. as applied to claim 9 above, and further in view of Urry (US 6,022,639). The disclosure of Hout in view of Fujii et al. and Chi et al. as discussed above is incorporated herein. Huot in view of Fujii et al. and Chi et al. does not teach the average zinc particle length or width.

11. Urry '639 discloses a zinc anode for an electrochemical cell. The zinc anode is comprised of zinc particles or flakes having an average length of 0.024 inches or approximately 610 microns (col. 3 lines 6-9; 28-30). Also, Urry '639 teaches that the width of the zinc particle ranges from 0.024 to 0.040 inches or approximately 610 to 1,016 microns (col. 3 lines 28-30). The particle length and width taught by Urry '639 falls with the ranges of the current application respectively. Urry '639 teaches that the thickness of the zinc material is preferably 10 to 20 times smaller than the next smallest dimension (col. 3 lines 18-20) in order for the particles to flow. Urry '639 also teaches that the thinner particles have the better optimum current density (col. 3 lines 25-26). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the zinc particles of Hout in view of Fujii et al. and Chi et al. to have the stated characteristic of particle length or width of 250 to 3000 micrometers to optimize the current density in the electrochemical cell as taught by Urry '639.

Claims 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Huot in view of Fujii et al. as applied to claim 5 above, and further in view of Urry (US

6,022,639). The disclosure of Hout in view Fujii et al. as discussed above is incorporated herein. Huot in view Fujii et al. does not teach the average zinc particle length or width.

Urry '639 discloses a zinc anode for an electrochemical cell. The zinc anode is comprised of zinc particles or flakes having an average length of 0.024 inches or approximately 610 microns (col. 3 lines 6-9; 28-30). Also, Urry '639 teaches that the width of the zinc particle ranges from 0.024 to 0.040 inches or approximately 610 to 1,016 microns (col. 3 lines 28-30). The particle length and width taught by Urry '639 falls with the ranges of the current application respectively. Urry '639 teaches that the thickness of the zinc material is preferably 10 to 20 times smaller than the next smallest dimension (col. 3 lines 18-20) in order for the particles to flow. Urry '639 also teaches that the thinner particles have the better optimum current density (col. 3 lines 25-26). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the zinc particles of Hout in view of Fujii et al. to have the stated characteristic of particle length or width of 40 to 1000 micrometers to optimize the current density in the electrochemical cell as taught by Urry '639.

12. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Huot in view of Fujii et al. as applied to claim 5 above, and further in view of Goldstein et al. (US 6,015,636). The disclosures of Hout in view of Fujii et al. as discussed above are incorporated herein. Huot in view of Fujii et al. does not teach that the particles of the zinc powder have different average characteristics.

13. Goldstein teaches the use of two zinc materials or metals for the anode of an electrochemical cell. There is an electrochemically prepared zinc (first zinc material) and a zinc prepared by thermal atomization (second zinc material) of molten zinc (col. 1 lines 24-31; 34-42). The first zinc material has an average particle size of less than 75 microns (col. 2 lines 25-31). The second zinc material has an average particle size of 150-250 microns (col. 2 lines 37-45). Due to the difference in particle size, the physical characteristics (particle length, width, and aspect ratio) of the first and second zinc materials are different. The combination of the first and second zinc material in an anode enhances the cell performance (col. 1 lines 57-60). It would have been obvious to one having ordinary skill in the art at the time of the invention was made to combine a first and second zinc metals having different physical characteristics as taught by Goldstein et al. to improve cell performance.

14. Claims 15, 16, 17, 18, 19, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Huot in view of Fujii et al as applied to claim 5 above, and further in view of Durkot et al. (US 2002/0155352). The disclosure of Hout in view of Fujii et al. as discussed above is incorporated herein. Huot in view of Fujii et al. does not teach the size, aspect ratio, or particle distribution of the zinc powder.

15. Durkot discloses an electrochemical cell anode comprised of zinc alloy particles suspended in a fluid. The particle size and percentage of particles at a given size is discussed in terms of the mesh screen size (paragraph 40). Fine zinc alloy particles have a particle size of 74 microns and dust zinc alloy particles have a particle size of 44 microns (paragraph 12,13, and 44). The zinc alloy fine and dust particles are from the

same source (paragraph 11). An anode having 10 or 45 percent zinc alloy particles of "dust" size or 44 microns is taught (paragraph 15, claims1, 2, 3, 22, and 25). The current application claims 0 to 50 and 0 to 20 percent of zinc alloy particles in the zinc material are 75 microns. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the 75 micron zinc alloy particles content range from 20 to 50 percent as taught by Durkot et al. due to the high discharge rate displayed by the electrochemical cell employing the zinc alloy (paragraph 11).

16. In regards to claims 18-20, the second zinc alloy is the fine zinc alloy. The aspect ratio is not explicitly stated but the ratio of the particle thickness is stated to be no more than 20 percent of the maximum length (paragraph 18). The fine particle size of 75 microns falls into the range of 54 to 425 microns. The preferred composition of 50 percent of the zinc alloy fine size particles is taught by the prior art (paragraph 38). It would have been obvious to one having ordinary skill in the art at the time of the invention to employ a first and second zinc alloy of varying sizes and composition level to enhance the electrochemical cell performance.

As well, claim 19 is a product-by-process claim. These claims are alternatively unpatentable. The courts have ruled that product-by-process limitations, in the absence of unexpected results, are obvious. See MPEP 2113. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process. The product of claim 19

and that of claim 18 appear to be the same. Both the cited reference and the claimed invention teach a zinc powder comprising a second zinc metal or zinc-alloy.

17. Claims 21-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Huot in view of Fujii et al as applied to claim 5 above, and further in view of Daniel-Ivad et al. (7,008,723). The disclosure of Hout in view of Fujii et al. as discussed above is incorporated herein. Huot in view of Fujii et al. does not teach the addition of bismuth, indium, aluminum, calcium, or lead (in parts per million). Daniel-Ivad discloses a method for producing an anode to be used in an electrochemical cell. A zinc-alloy is the active material of the anode (col. 3 lines 63-66). The zinc-alloy material may be powder, particulate, or in the form of flakes (col. 3 line 66 to col. 4 line 4). The zinc-alloy material may be comprised of zinc, lead, bismuth, calcium, aluminum, and any combinations thereof (col. 4 lines 6-12). The zinc-alloy may contain up to 800 ppm of lead, up to 800 ppm indium, up to 500 ppm calcium, and up to 200 ppm of bismuth and up to 200 ppm of aluminum. The addition of the above mentioned additives to the zinc anode result in better morphology of the zinc anode and improved cell performance. The addition of the additives also reduces the amount of gassing that takes place in the electrochemical cell (col. 4 lines 44-61, Examples 1-5). It would have been obvious to one having ordinary skill in the art at the time invention was made to produce zinc-alloy employing additives such as lead, bismuth, calcium, aluminum, and any combination thereof to enhance the electrochemical cell performance by reducing gassing in the electrochemical cell as taught by Daniel-Ivad et al.

18. Claims 40-43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Huot in view of Fujii et al. as applied to claim 5 above, and further in view of Urry et al. (US 6,627,349), Urry (US 6,333,127), and Guo et al. (US 6,602,629). The disclosure of Hout in view of Fujii et al. as discussed above is incorporated herein. Huot in view of Fujii et al. does not teach an anode having a zinc powder a fluid medium or the use of polyacrylic acid in gelling the KOH electrolyte.

19. Urry '349 discloses an electrode for an electrochemical cell. The anode is comprised of a zinc powder that is suspended in a fluid medium (col. 1 lines 21-23). The fluid medium is a gelled electrolyte KOH mixture (col. 1 lines 13-16; 21-23). It would have been obvious to one having ordinary skill in the art at the time of the invention to employ a gelled KOH electrolyte mixture to ensure proper operation of the electrochemical cell.

20. Urry '127 discloses the use of polyacrylic acid as the gelling agent in a gelled zinc anode for an electrochemical cell (col. 1 lines 24-27). The gelling agent in the zinc anode allows for a low viscosity mixture and a uniform dispersion of zinc powder throughout the anode (col. 1 lines 36-39). It would have been obvious to one having ordinary skill in the art at the time of the invention to use polyacrylic as a gelling agent to improve particle-to-particle contact and particle- to-current collector contact in the cell and thereby improving conductivity (col.1, lines 51-58).

21. Guo et al. discloses a zero mercury air electrochemical cell. The anode material is a zinc-lead alloy (abstract). The electrolyte is about 97 weight percent potassium hydroxide (KOH), about 3 weight percent zinc oxide (ZnO), and a small amount of

polyethylene glycol (col. 6 lines 28-36; Table 1). The KOH is a 33 percent aqueous solution. It would have been obvious to one having ordinary skill in the art at the time of the invention to produce an electrolyte solution that is 98 percent aqueous KOH and 2 percent zinc oxide to ensure proper operation of the electrochemical cell.

22.

Response to Arguments

The rejection of claims 8 and 11 under 35 U.S.C. 112, first paragraph, is withdrawn due to the cancellation of the claims. The rejection of claims 5, 7, 8, 10, 11, 13, 15, 22, 23, 26, 28, 29, 31, 33 and 35 under 35 U.S.C. 112, second paragraph, is withdrawn due to either the amendment or the cancellation of the listed claims.

Applicant's arguments with respect to claim 5 have been considered but are moot in view of the new ground(s) of rejection necessitated by amendment.

With respect to the shape of the zinc particles, Clash teaches various zinc particle shapes for electrochemical cells. Clash teaches that zinc particles can have spheroid morphology such as spherical or teardrop shapes or acicular (page 6 line 30 to page 7 line 17). Clash teaches that the addition of such uniformed shaped zinc particle decrease the amount of zinc required for the anode (page 14 lines 14-16). The tap density of the zinc particles is low and therefore a matrix can be formed in a low total zinc content anode gel (page 15 lines 26-28).

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Susy Tsang Foster

SUSY TSANG-FOSTER
PRIMARY EXAMINER